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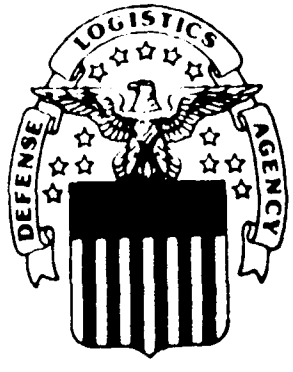
DLA-91-P10027

# Transportation Cost Analysis for Vendor Consolidation - New Jersey RFCC

June 1991

OPERATIONS RESEARCH AND ECONOMIC ANALYSIS OFFICE






DEPARTMENT OF DEFENSE
DEFENSE LOGISTICS AGENCY



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## FOREWORD

This report documents the results of a transportation cost analysis of vendor freight consolidation at the New Jersey Regional Freight Consolidation Center (RFCC) contractor operated facility for the 8-month period ending 30 September 1990. The study is the result of a request from the Directorate of Supply Operations, Transportation Division, RFCC Program Office (RFCCPO) and is part of the continuing analysis of RFCC implementation and operation.

Our analysis showed that during the 8 months of operation reviewed, vendor consolidation at New Jersey saved approximately $614,910 in transportation expenditures. Based on observed trends in the RFCC data for New Jersey, transportation savings are expected to continue.

ROGER C. ROY
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## I. BACKGROUND

The Defense Logistics Agency's (DLA) Directorate of Supply Operations, Transportation Division (DLA-OT), Regional Freight Consolidation Center Program Office (RFCCPO) requested a transportation cost analysis of vendor consolidation at the New Jersey Regional Freight Consolidation Center (RFCC). The analysis covers vendor shipments destined for the six DLA supply depots between 1 February 1990 and 30 September 1990.

Vendor consolidation is the process of collecting small, less-than-truckload (LTL) shipments from commercial vendors at or near origin and combining these shipments to build larger LTL or truckload (TL) shipments for movement to the DLA supply depots to replenish inventory. Savings are expected to accrue based on the difference in the cost of shipping many small LTL shipments direct to the depots versus the cost of collecting those same LTL shipments at a facility at or near origin and consolidating them into one large LTL or TL shipment for movement to the depots at a lower volume rate.

Studies conducted by the DLA Operations Research and Economic Analysis Management Support Office (DLA-LO(DORO)) have shown that vendor consolidation has the potential to save considerable transportation dollars. Currently, any savings achieved through this program will be indirect since the vendor will ship to the RFCC free-on-board destination. DLA expects these savings will eventually be passed on through lower item prices. The scope of this report covers only the estimated transportation cost differential between direct shipment to a depot versus transshipment through the RFCC system. A determination as to whether DLA has received a reduction in contract prices is beyond the scope of this report.

## II. STUDY APPROACH

A. Purpose. The purpose of this study is to determine if vendor consolidation at the New Jersey RFCC is a cost effective means of shipping vendor freight to the six DLA depots.

B. Objectives. The objectives are as follows:

1. To determine the characteristics of shipments into and out of the RFCC (mode and weight).

2. To estimate vendor shipping costs for both direct and RFCC routed shipments. Use the calculated costs to compare the two methods of shipment and determine the dollar cost differentials.

3. Identify any problems with consolidation at the RFCC site and offer recommendations for improvement.

## III. ANALYSIS

### A. Inbound Shipment Characteristics

Vendor shipments are moved to the RFCC by three main methods of transportation; they are commercial motor carrier, private motor carrier, and small parcel carrier. These shipments can be categorized into two shipment types, LTL and small parcel. Figure 1 shows a breakdown of inbound shipments by aggregated weight, number of shipments, and average weight. Small parcels account for approximately 85 percent of the number of shipments (45,909 shipments) and 6 percent of the total shipment weight (747,288 pounds) received at the RFCC. On the other hand, LTL freight amounts to about 15 percent of the number of shipments (7,926 shipments) and 94 percent of the total shipment weight (11,392,905 pounds).

Inbound tonnage has remained level over the 8-month period. Table 1 shows a breakdown of the tonnage for the period 1 February 1990 through 30 September 1990 for New Jersey. Included in Table 1 are average weights for both LTL and small parcels. An average inbound LTL shipment weighed 1437 pounds while inbound small parcels averaged 16.3 pounds. Figure 2 shows the information graphically.

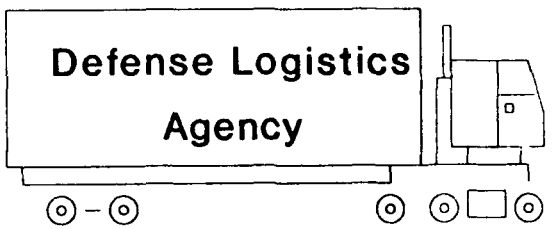
Table 1

VENDOR RECEIPTS BY MONTH - NEW JERSEY

| Month | Weight | Shipments | Average Weight Parcels | Average Weight LTL |
|---|---|---|---|---|
| Feb | 1,365,318 | 6,195 | 17 | 1,437 |
| Mar | 1,669,610 | 7,436 | 17 | 1,470 |
| Apr | 1,436,422 | 6,691 | 16 | 1,392 |
| May | 1,527,486 | 7,318 | 16 | 1,326 |
| Jun | 1,741,114 | 6,910 | 16 | 1,600 |
| Jul | 1,410,345 | 6,806 | 16 | 1,358 |
| Aug | 1,660,770 | 6,514 | 16 | 1,403 |
| Sep | 1,329,128 | 5,965 | 16 | 1,533 |
| Total | 12,140,193 | 53,835 | 16 | 1,437 |

### B. Outbound Shipment Characteristics

After vendor shipments arrive at the RFCC they are consolidated into large LTL or TL shipments and forwarded to the DLA depot consignee on a routine basis. Outbound shipment weights should be considerably higher than the weights of shipments received from the vendors. Experience gained since the beginning of the vendor consolidation phase of the RFCC concept has shown that carrier trailers will reach maximum cube utilization between 18,000 and 25,000 pounds depending on the product mix. Shipment frequencies should be relatively low but do depend on the distance and time needed to deliver the freight to the receiving depot within specified standards. Table 2 shows the average




## RFCC INBOUND VENDOR SHIPMENTS

New Jersey RFCC - Feb 90 thru Sep 90

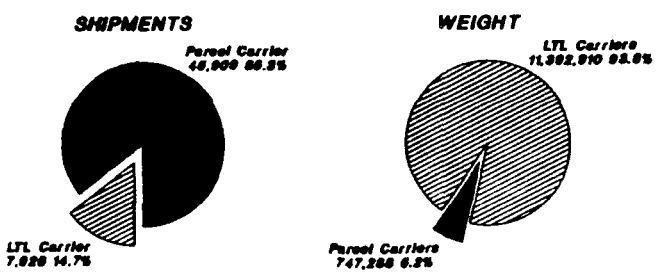



Figure 1

## INBOUND VENDOR TONNAGE

New Jersey RFCC Site

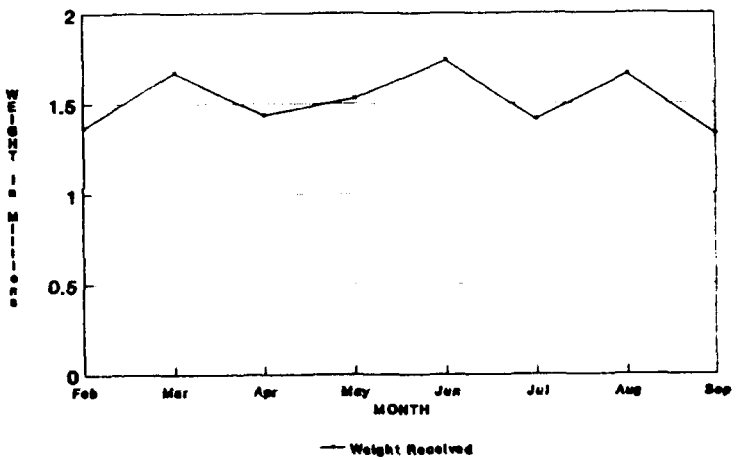



Figure 2

outbound shipment weight by month and receiving depot. Table 3 shows the corresponding outbound shipment frequencies.

Table 2

AVERAGE OUTBOUND SHIPMENT SIZE IN POUNDS

| | DDRV | DDCO | DDMP | DDTC | DDOU | DDMT |
|---|---|---|---|---|---|---|
| Feb | 7,451 | 5,382 | 7,519 | 10,573 | 9,827 | 7,441 |
| Mar | 14,617 | 12,752 | 17,320 | 15,188 | 12,961 | 9,621 |
| Apr | 12,978 | 14,890 | 21,066 | 10,842 | 19,786 | 14,837 |
| May | 12,890 | 17,587 | 20,600 | 13,569 | 16,709 | 19,255 |
| Jun | 18,177 | 21,522 | 17,330 | 19,941 | 23,026 | 12,550 |
| Jul | 16,379 | 15,067 | 21,556 | 14,936 | 8,392 | 16,656 |
| Aug | 18,913 | 18,971 | 24,506 | 15,791 | 14,682 | 17,860 |
| Sep | 17,421 | 20,736 | 16,986 | 20,482 | 14,634 | 18,886 |

Table 3

OUTBOUND SHIPMENT FREQUENCIES

| | DDRV | DDCO | DDMP | DDTC | DDOU | DDMT | Total |
|---|---|---|---|---|---|---|---|
| Feb | 29 | 34 | 29 | 34 | 25 | 36 | 187 |
| Mar | 18 | 15 | 17 | 26 | 19 | 24 | 119 |
| Apr | 19 | 9 | 11 | 30 | 15 | 16 | 100 |
| May | 19 | 9 | 15 | 24 | 12 | 14 | 93 |
| Jun | 15 | 9 | 17 | 24 | 11 | 20 | 96 |
| Jul | 14 | 10 | 12 | 24 | 19 | 16 | 95 |
| Aug | 17 | 10 | 12 | 25 | 14 | 19 | 97 |
| Sep | 12 | 6 | 9 | 13 | 12 | 12 | 64 |

The average weight per outbound shipment has tended to stabilize over the time period studied while the frequency of shipments has continued to decrease. It appears that the carrier is attempting to reach maximum consolidation by fully utilizing available trailer space except for shipments to the Defense Depot Tracy, CA, where transit times dictate more frequent shipments. Table 4 gives a breakdown of weight received by depot.

Table 4

DEPOT RECEIPTS - FEB 1990 TO SEP 1990

| Depot | Shipments | Weight |
|---|---|---|
| Richmond | 143 | 2,003,208 |
| Columbus | 102 | 1,325,051 |
| Mechanicsburg | 122 | 2,053,432 |
| Tracy | 200 | 2,903,364 |
| Ogden | 127 | 1,783,146 |
| Memphis | 157 | 2,086,804 |
| Total | 851 | 12,155,005 |

C. Cost Analysis

Cost comparison of RFCC routed versus non-RFCC shipments necessitates that the data be processed into three files. The first covers shipments from the vendor to the RFCC for consolidation. This file is built by aggregating the RFCC history file for New Jersey by inbound bill number. The second file incorporates shipments made from the RFCC to each of the DLA depots. This file is built by aggregating the RFCC history file on outbound government bill of lading (GBL) number. By combining the shipments in both files, movement through the RFCC system is emulated. A third file was built from the RFCC history file which simulated shipment of the same material on a direct basis from vendor origin to the DLA depot consignee. Direct shipments were aggregated by inbound bill number, depot destination, and contract number. The total number of RFCC routed shipments was 53,835 while the number of direct shipments was estimated at 66,201. The difference of 12,366 in the number of shipments between RFCC routed and non-RFCC shipments reflects a secondary level of consolidation being accomplished at the vendor origin (for example, more than one depot's freight on the same bill going to the RFCC site).

Once the files were built, they were rated using a program designed to individually rate each shipment with the appropriate rate tables. Direct LTL shipments were rated with commercial class rates[1] at class 50 with a 10 percent discount. LTL shipments from vendor to the RFCC site for consolidation were also rated at class 50 with a 10 percent discount. The rate level and discount are based on samples of inbound vendor shipments taken at the New Jersey RFCC[2] and from a sample of direct vendor shipments into the Defense Depot at Richmond, VA (internal DORO analysis). Small parcels were rated using United Parcel Service surface parcel rates. Consolidated shipments from the RFCC to the DLA depots were rated using the applicable government tenders. After completing the rating process, the cost data were compiled and the results are shown in Table 5.

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[1] Class rating is a method used by the commercial motor carrier industry to assign rate scales to different types of commodity groups. Rate classes range from Class 50 for high density commodities that take up little space to Class 500 for low density items that require a lot of space. DLA traditionally paid Class rates for freight-all-kinds (FAK) on shipments out of its depots prior to the Guaranteed Traffic Program.

[2] Defense Logistics Agency, "Transportation Cost Analysis of New York EDDS Vendor Consolidation," DLA Project No. DLA-90-P90174, March 1990.

Table 5

SAVINGS PROJECTION FOR THE NEW JERSEY RFCC

| MONTH | IN | OUT | TOTAL RFCC | TOTAL DIRECT | PROJECTED SAVINGS (LOSS) |
|---|---|---|---|---|---|
| Feb | $130,083 | $178,343 | $308,426 | $318,950 | 10,524 |
| Mar | 163,302 | 158,462 | 321,764 | 391,944 | 70,180 |
| Apr | 147,201 | 139,648 | 286,849 | 343,058 | 56,209 |
| May | 157,140 | 133,147 | 290,287 | 377,811 | 87,524 |
| Jun | 161,090 | 148,440 | 309,530 | 403,226 | 93,696 |
| Jul | 143,014 | 130,433 | 273,447 | 352,656 | 79,209 |
| Aug | 159,577 | 140,288 | 299,865 | 416,224 | 116,359 |
| Sep | 129,544 | 96,949 | 226,493 | 327,702 | 101,209 |
| Total | $1,190,951 | $1,125,710 | $2,316,661 | $2,931,571 | $614,910 |

Savings appear to be consistent now that the RFCC concept is becoming the normal operating procedure for the vendors using the RFCC system. Costs both in and out of the RFCC appear to be reasonable and consistent. As the system is enlarged to include other services and the vendors gain more confidence in the system, savings should continue to grow accordingly.

## IV. CONCLUSIONS

Vendor consolidation at the New Jersey RFCC has resulted in an estimated net savings of $614,910 during the the period 1 February 1990 through 30 September 1990. Estimated monthly savings have increased considerably over the 8-month time period with projected savings in August and September 1990 in excess of $100,000 per month.

The carrier appears to have made a good improvement in trailer utilization over the 8-month time period with average shipment sizes currently ranging between 15,000 and 21,000 pounds, depending on the destination. If this trend continues, estimated savings from vendor consolidation at the New Jersey RFCC should continue.

V. RECOMMENDATION. Continue to monitor carrier operations to insure that maximum consolidation is maintained.

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